Understanding the Growth Indicator in ESSA

February 2, 2018

The Approved ESSA School Index Score Includes Three Indicators That Incorporate Student Growth

Growth in Academic Achievement: Math & ELA

Growth of English Learners in English Language Proficiency

Growth in Science Achievement

Table 17. Combining and Weighting Indicators for the ESSA School Index

Indicator	Weight of Indicator within Index Grades K – 5 & 6 - 8	Indicator	Weight of Indicator within Index High Schools
Weighted Achievement Indicator	35%	Weighted Achievement and Academic Growth	70% total with Weighted Achievement accounting for half (35%) and School Growth Score accounting for half (35%)
Growth Indicator Academic Growth English Language Progress	50%		
Progress to English Language Proficiency	Proportionately weighted in School Growth Score by Number of English Learners 1:1 ELP to Content Growth	Progress to English Language Proficiency	Proportionately weighted in School Growth Score by Number of English Learners 1:1 ELP to Content Growth
Graduation Rate Indicator 4-Year Adjusted Cohort Rate 5-Year Adjusted Cohort Rate	NA	Graduation Rate Indicator 4-Year Adjusted Cohort Rate 5-Year Adjusted Cohort Rate	15% total 4-Yr = 10% 5-Yr = 5%
School Quality and Student Success Indicator	15%	School Quality and Student Success Indicator	15%

What do we mean by growth?

- Growth—the process of developing

Growth Seems Intuitive

- Development over time in a variety of ways
- Physical, emotional, cognitive, etc.

For our purposes…

Change in achievement from one point in time to another point in time.

Growth in Academic Achievement

- Growth in academic achievement can be measured in a variety of ways.
  - https://scholar.harvard.edu/files/andrewho/files/a_practitioners_guide_to_growth_models.pdf

  - *"If this were a guide only for the growth models that aligned with intuition, it would be a short guide that excluded a number of models inactive use across states. Although these models may be less intuitive, they often answer useful questions about longitudinal data that "intuitive" growth models do not answer."*

Old Growth Model Under NCLB: Growth to Standard (GTS)
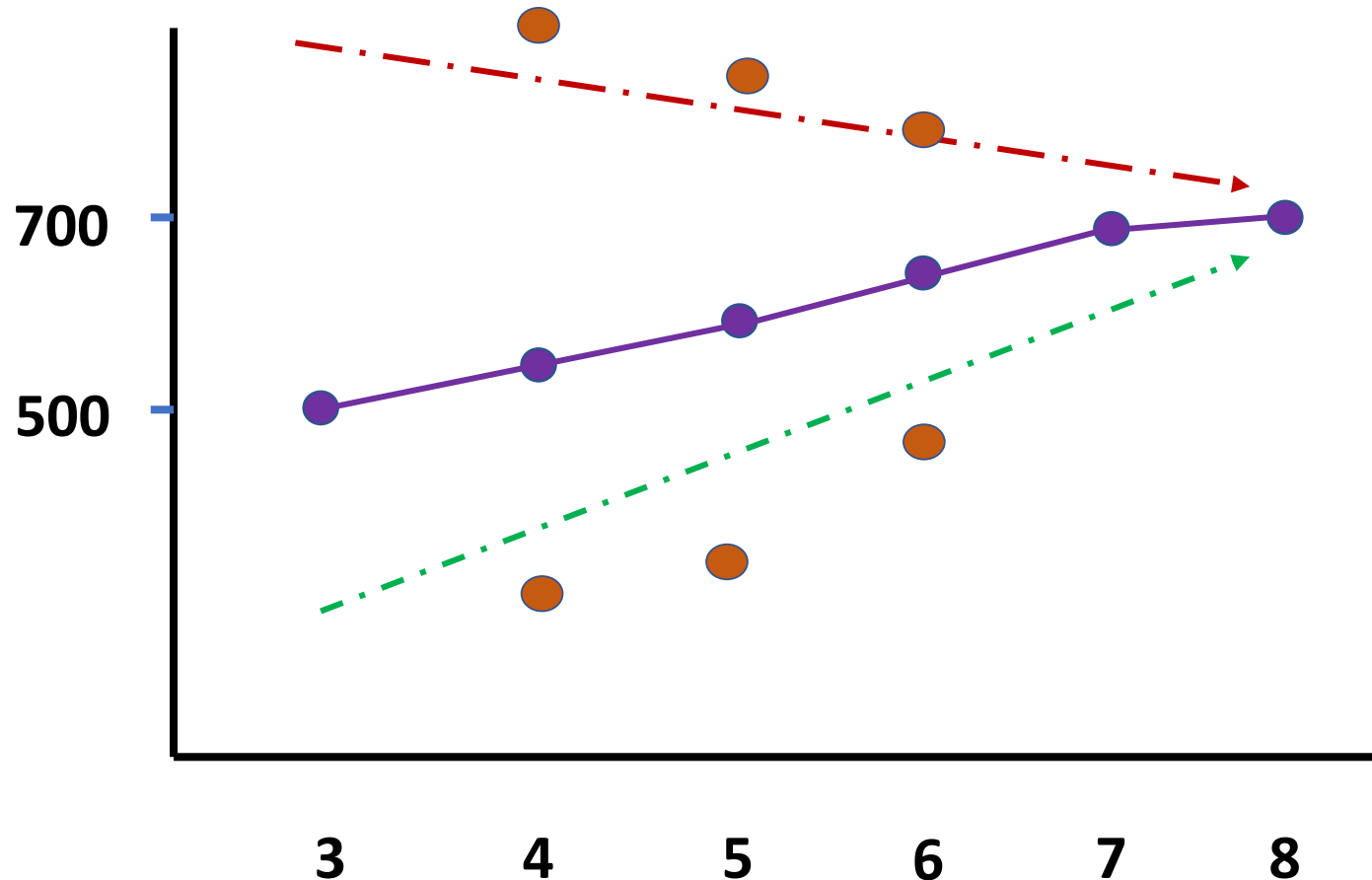
Correlation between schools' Percent Proficient GTS in 2014:
$r = 0.91$

Very strong, positive relationship
I.e., in general, high achievement/high GTS and vice versa, low achievement/low GTS

Correlation between School Percent Proficient and Percent Poverty:
$r = -0.47$
Correlation between School Percent Proficient and GTS:
$r = -0.49$

ESSA Growth Indicator

- ## A Simple Value-Added Growth Model
  - *How much did a student grow this year compared to how much we thought he/she would grow based on what we know about his/her achievement in prior years (the student's score history)?*
- ## Technically:
  - Score history = students achievement scores over time
    - current year + up to four prior years.
  - Controls for student-level factors that schools and teachers don't have control over
    - Students' poverty status, minority status, English learner status, special education status

At the Student Level: Two Steps

1-What do we expect based on what we know from past and current score?

2-Did the student, meet, exceed or not meet?
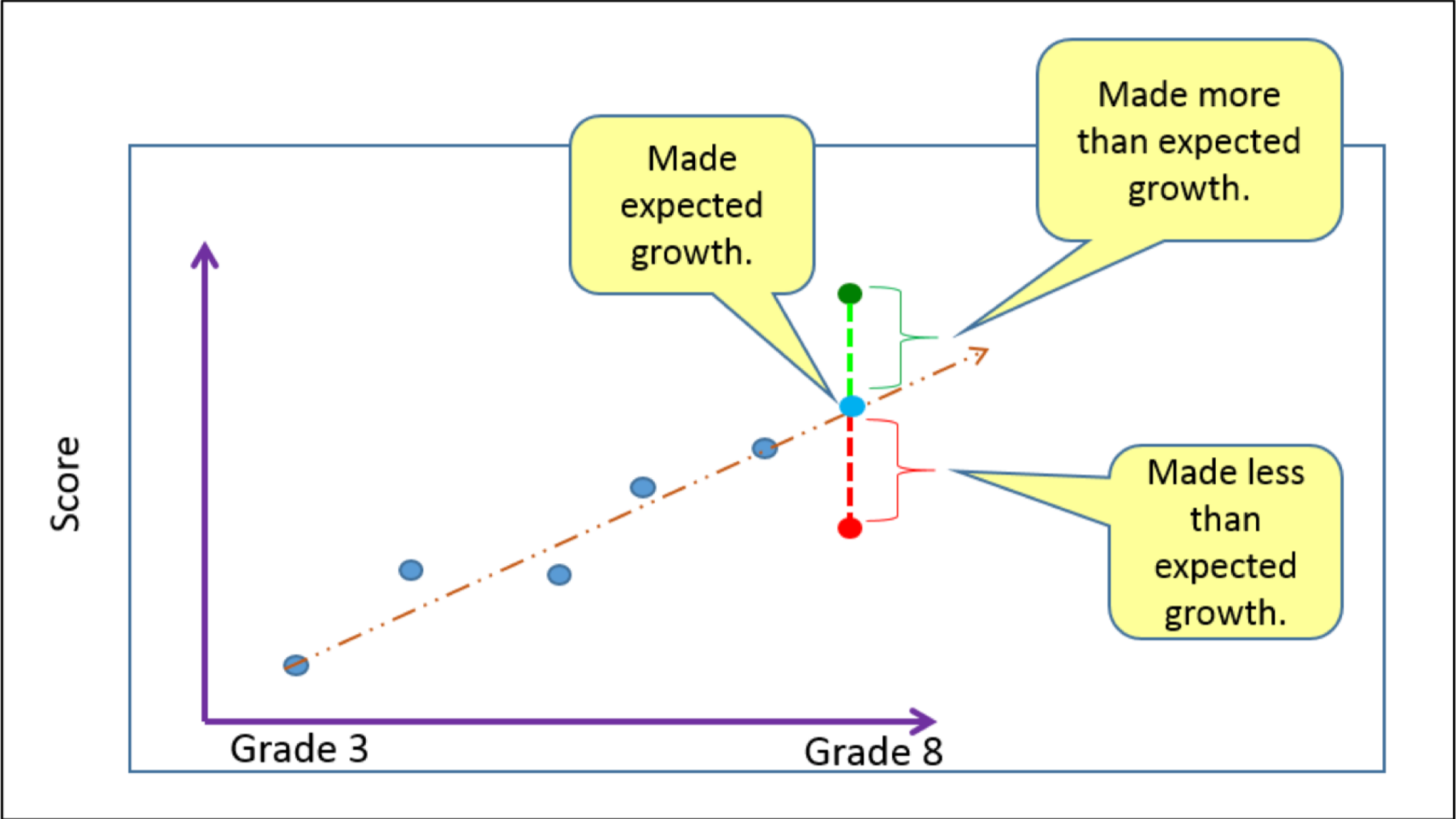
Student's Scores are Placed on a Standard Scale

- To calculate growth across different tests use a standard score (z score)

Calculating the Standard Score (Z-Score)

$$\text{Standard Score, } z = \frac{X - \mu}{\sigma}$$

TERMS:
μ = mean (pronounced 'mu')
X = score
σ = standard deviation (pronounced 'sigma')

$$z\ Score = \frac{412 - 422.19}{6.31} = -1.61$$

$$z\ Score = \frac{423 - 422.19}{6.31} = 0.13$$

$$z\ Score = \frac{430 - 422.19}{6.31} = 1.24$$

- Construct a score history using students' z scores

Student Growth Scores

- Calculate growth scores using a mixed model (Appendix D, page 162 of Final ESSA Plan)
    - Score histories are nested within students
- Expected Score and Residual are produced by mixed model
- Residual = Student Growth Score = (Observed Score – Expected Score)

Less than expected - About what we expected - More than we expected

- values   ~ 0   + values
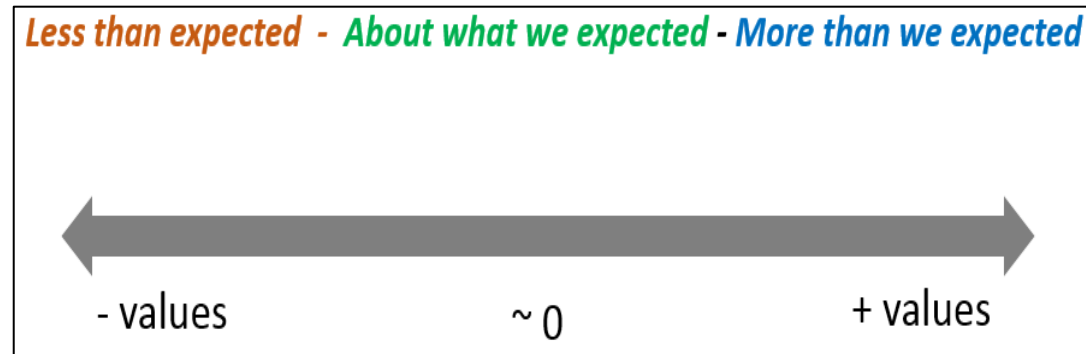
Who can meet or exceed expected growth? Any Student!

Are high achieving students able to meet or exceed expected growth?

YES!

Are lower achieving students able to meet or exceed expected growth?

YES!

Are students in the middle of the achievement range able to meet or exceed expected growth?
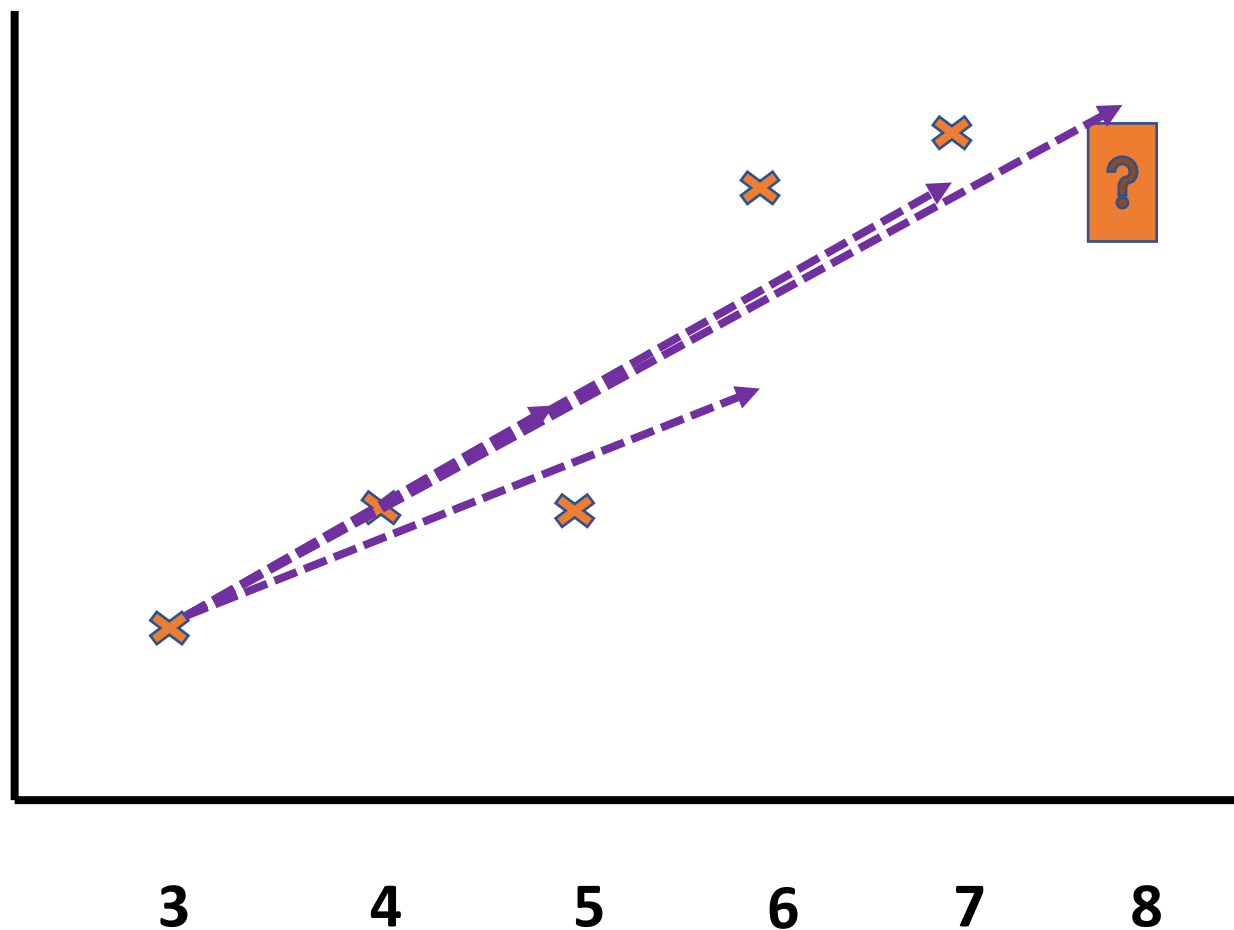
YES!

All students have a growth expectation based on their past achievement.

All students are expected to grow in academic achievement each year.

# Does a student's expected growth adjust each year?

If a student is declining, will he/she be expected to keep declining? Won't the expected growth keep going down?

- Not necessarily, even though the student's score history helps set the expectation for growth…

- the achievement of other students at the same grade level in the current year help adjust the expectation when the student is further away from the mean.
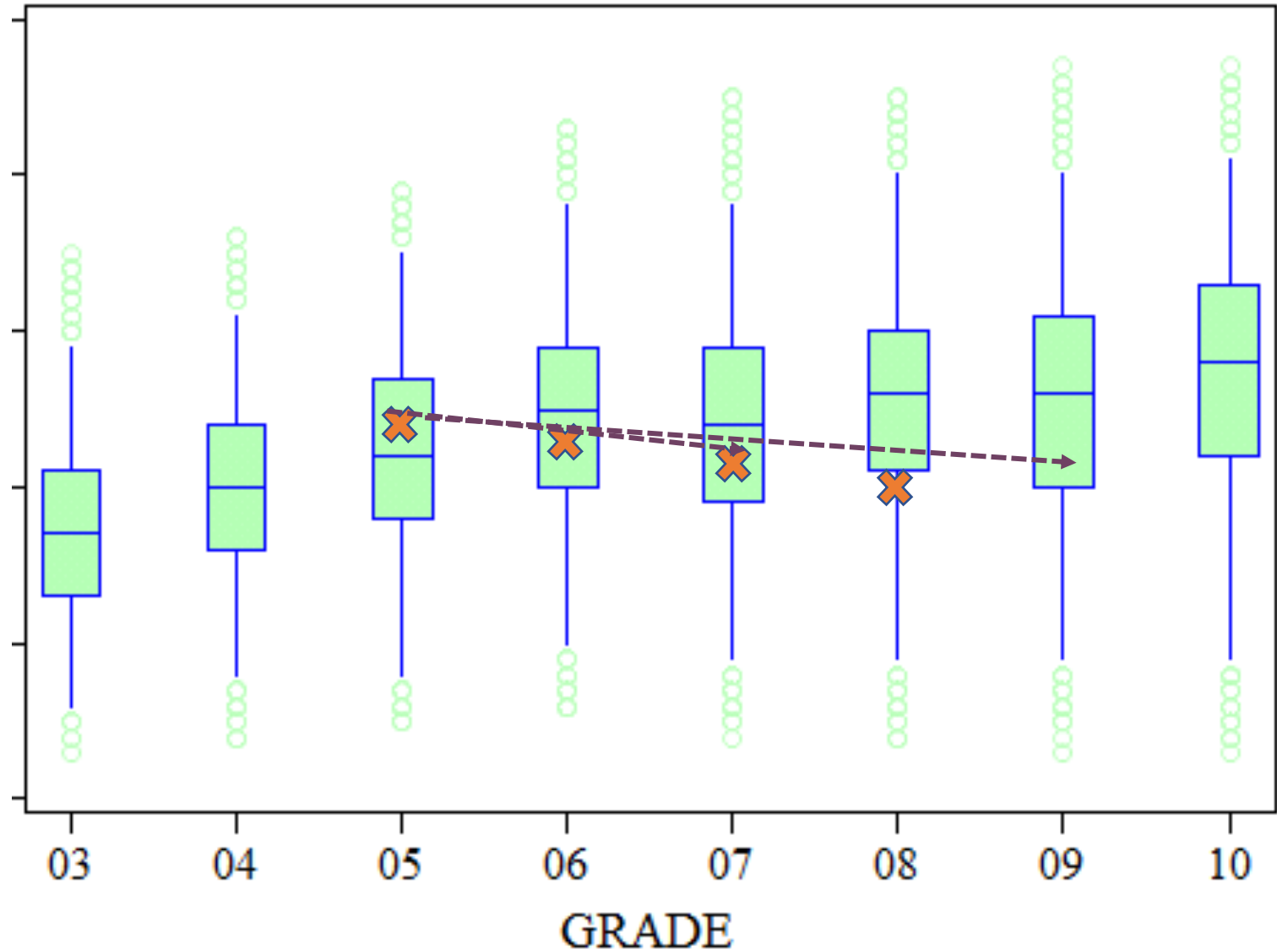
Similar but not the same: ACT Aspire predicted paths

ACT Aspire's predicted paths project give an approximation of where a student might be expected to score on the ACT Aspire achievement scale based on the current year score and typical academic growth of all students who took ACT Aspire.
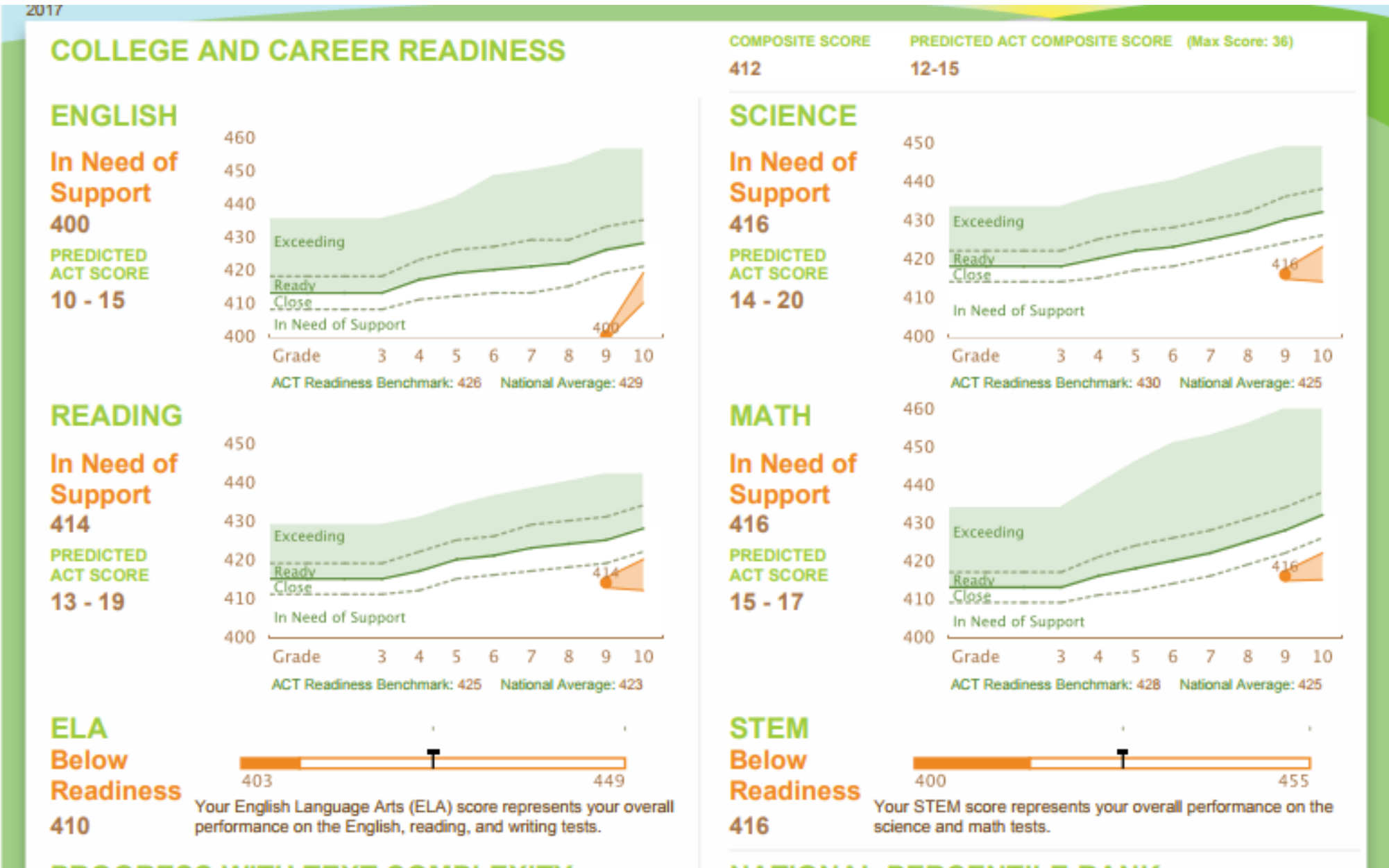
If a student is consistently really high achieving, can he/she meet or exceed expected growth?

- Yes, the score history will help set the expectation to continue to achieve at high levels...

- *AND,* the achievement of other students at the same grade level in the current year help adjust the expectation when the student is further away from the mean.
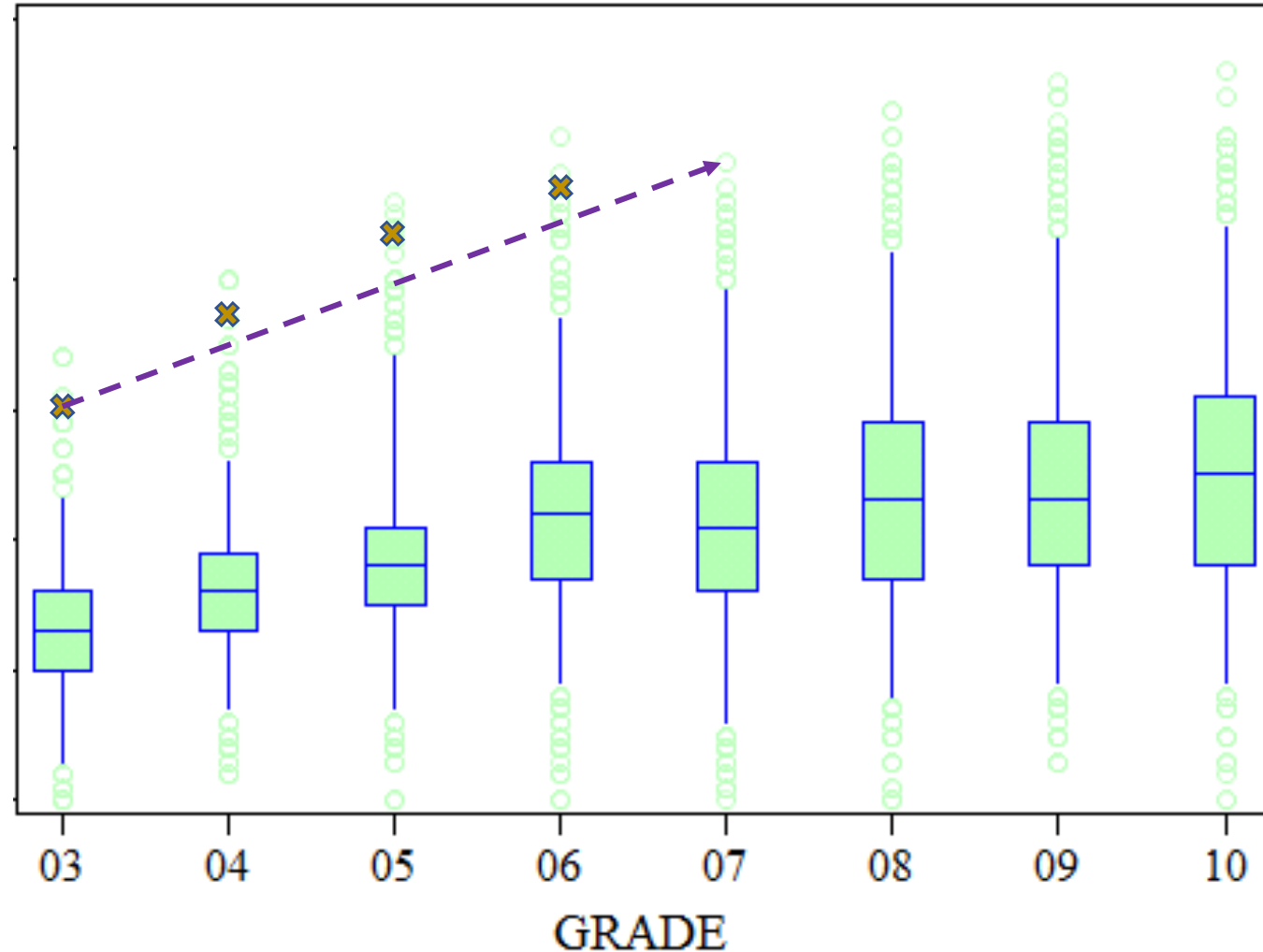
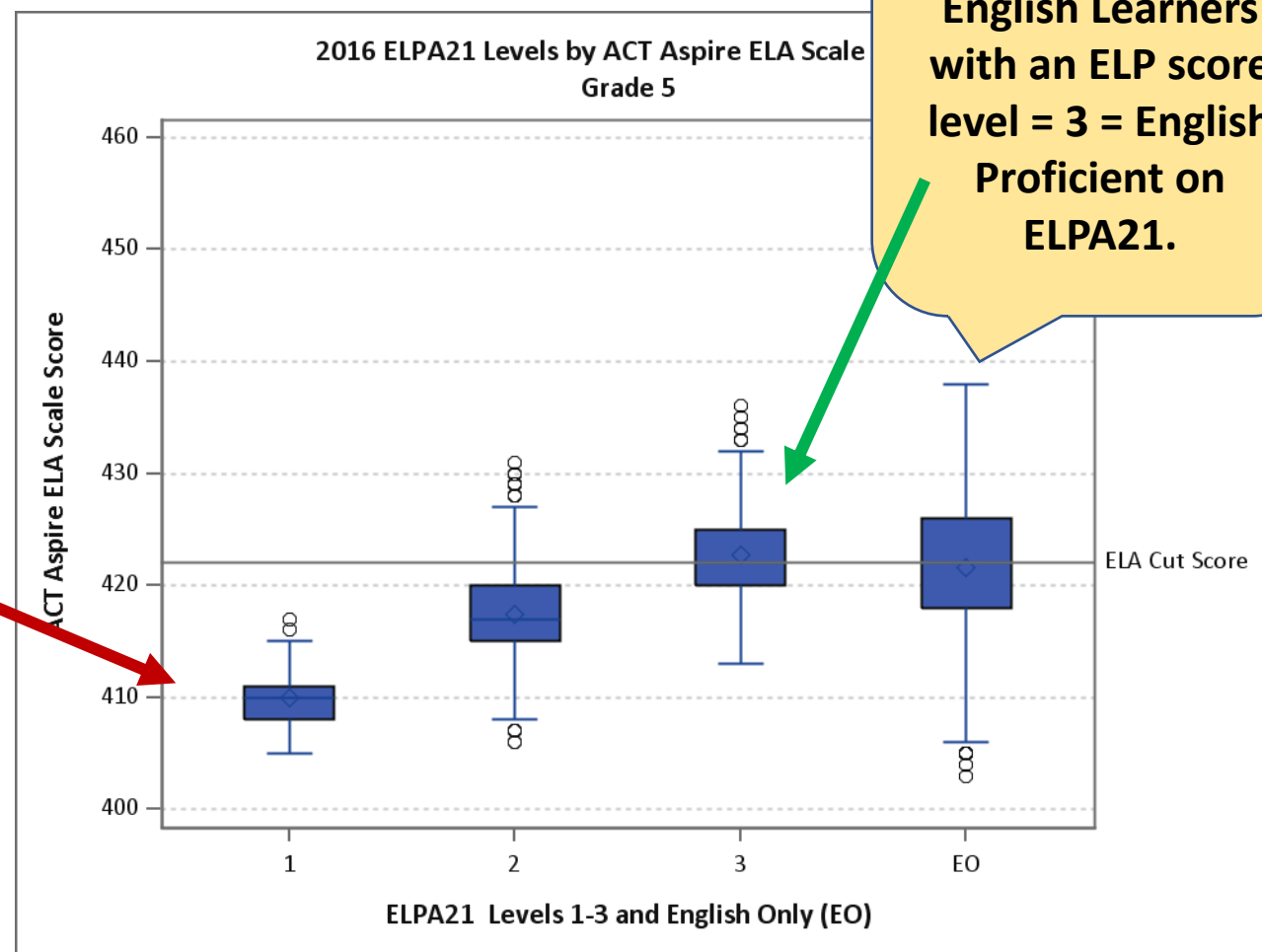# What about the English Learner Progress to English Language Proficiency Indicator?

Informed by stakeholders and the English Learner Advisory Team

Progress to English Language Proficiency (ELP)

Research Literature on English Learners as well as Arkansas data on English Learners, support Arkansas's approach to including the indicator for Progress to ELP in Arkansas's growth indicator.

Notice that the lower the ELP level of an English Learner the lower the students' achievement scores on the English Language Arts (ELA) assessment.

In general, as English Learners' ELP increases their ELA achievement scores increase.

Compare the English Only score distribution to the English Learners with an ELP score level = 3 = English Proficient on ELPA21.

2016 ELPA21 Levels by ACT Aspire ELA Scale
Grade 5

ACT Aspire ELA Scale Score

ELA Cut Score

ELPA21 Levels 1-3 and English Only (EO)

This pattern of achievement for English Learners is evident across all grades and for math as well as ELA
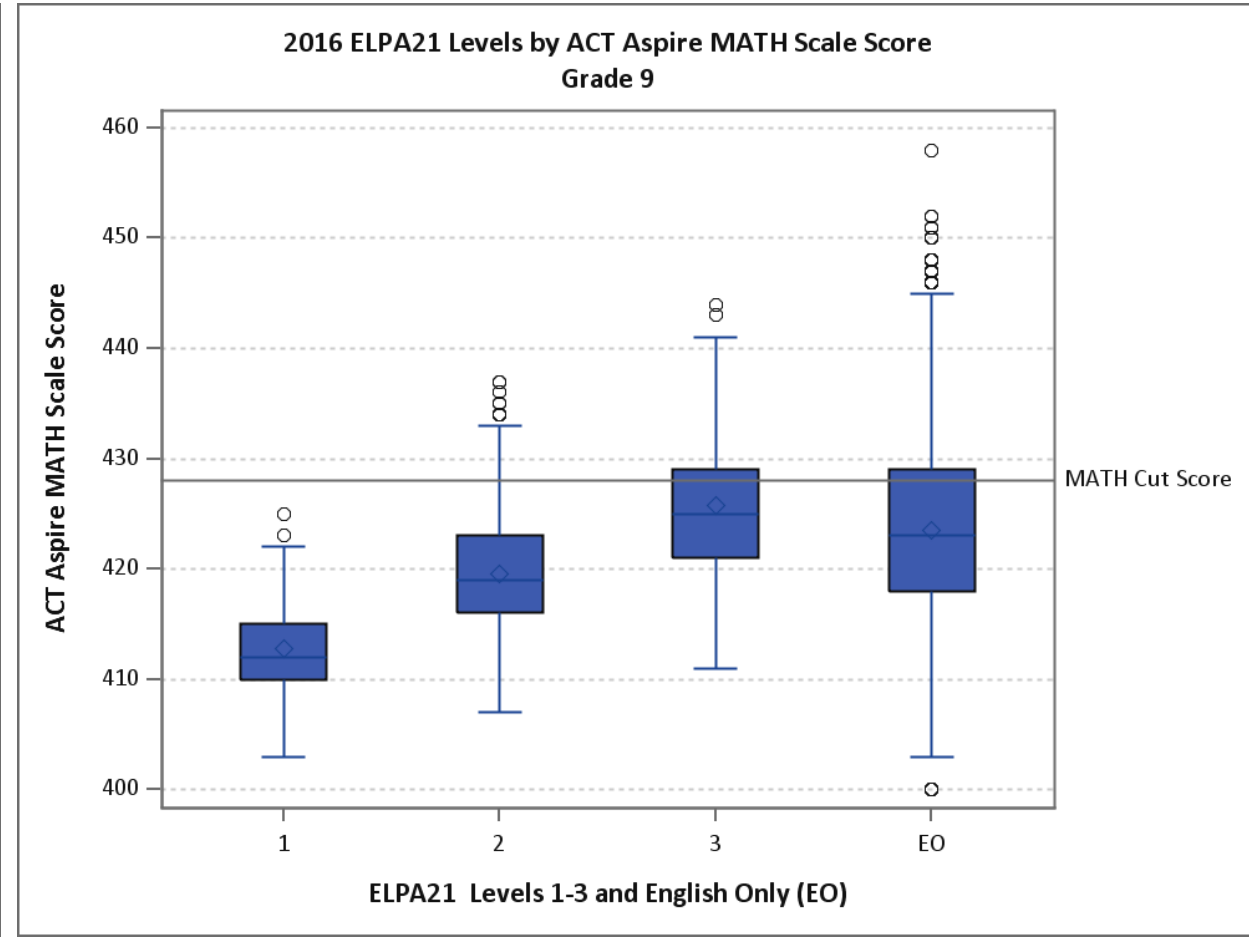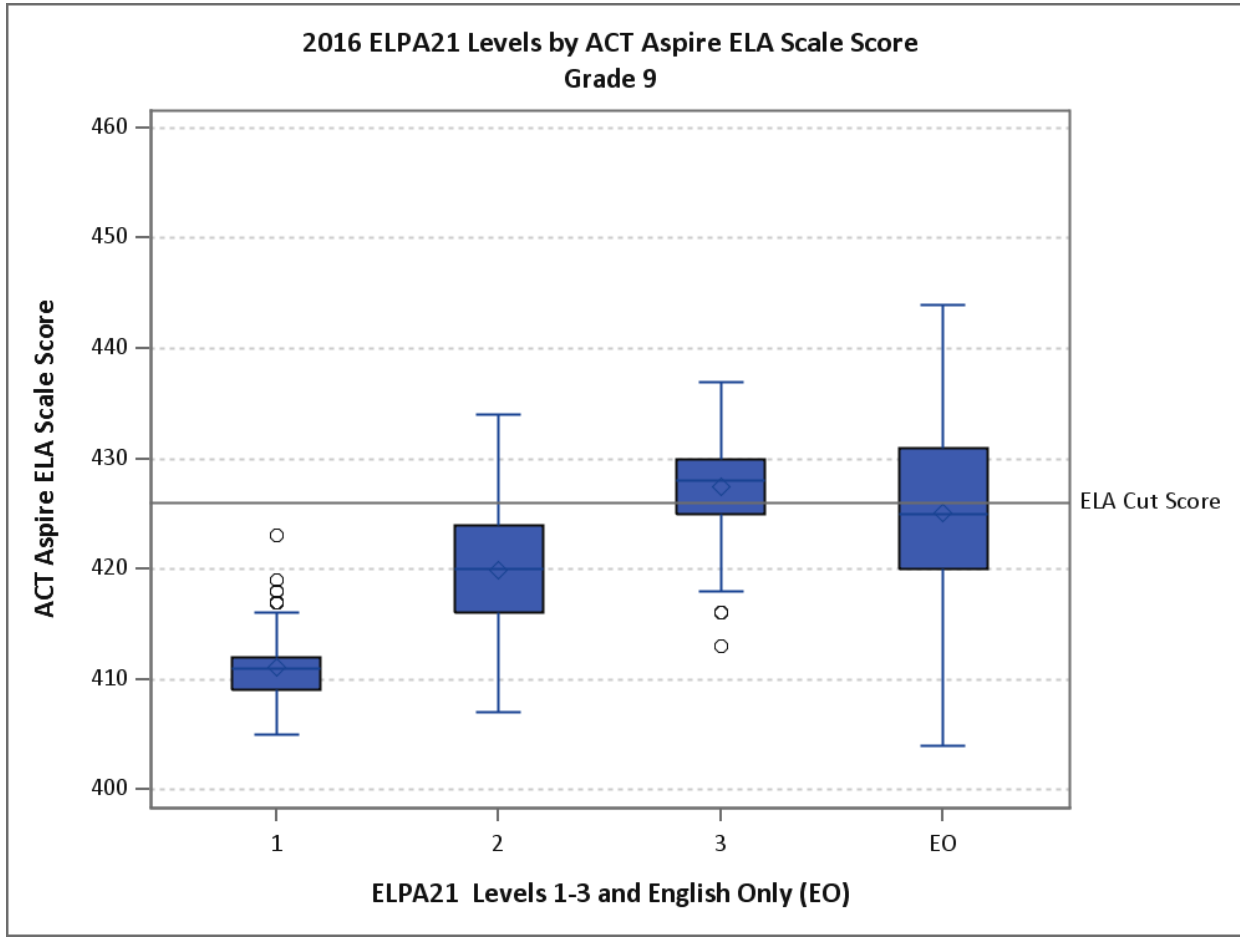
ESSA School Index Includes Considerations for English Learners in Growth

1. Each English Learner's ELP Level on ELPA21 is included at the student level in the ELA and math value-added model *to control for the student's language proficiency level.*

2. **School Value-Added Growth Score (School VAS):**
   - **Content Value-Added Score (Content VAS):** Each student's math and/or ELA value-added growth score (combined into a Content VAS) is included in the School VAS used in the ESSA School Index.
   - **English Learner Value-Added Scores (ELP VAS)** are also included in the School VAS used in the ESSA School Index.
   - *For English Learners there are two scores in the School VAS:*
   - Content VAS
     - ELP VAS

Thus, *the indicator for Progress to English Language Proficiency* is included in the School VAS *in proportion to the number of English Learners with growth scores.*

School Value-Added Growth Scores are Transformed to Fit in the ESSA School Index

- Eighty is used to represent the 0 average growth score.

$$School\ Growth\ Score = (School\ Value\text{-}added\ Score\ \times 35) + 80.00$$

- A school mean value-added growth score of 80 indicates, on average, students are meeting expected growth.
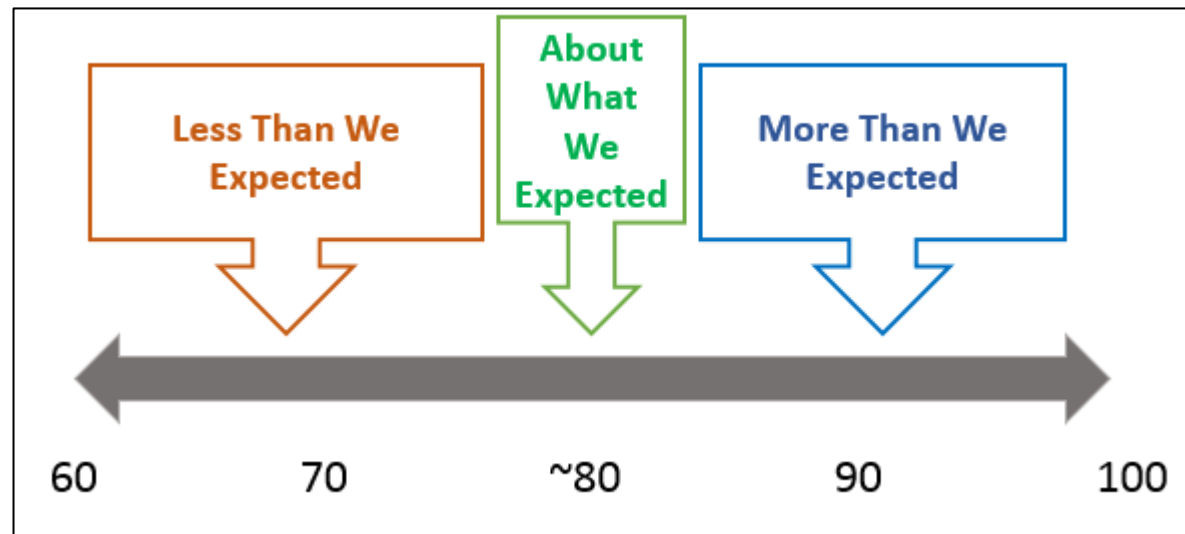
ESSA School Index:
Content Growth with ELP Growth for School Growth Indicator

- The degree to which the growth indicator is informed by growth on the ELP assessment is proportional **_to the percentage of students with ELP growth scores_** when combining Content Growth and ELP Growth.
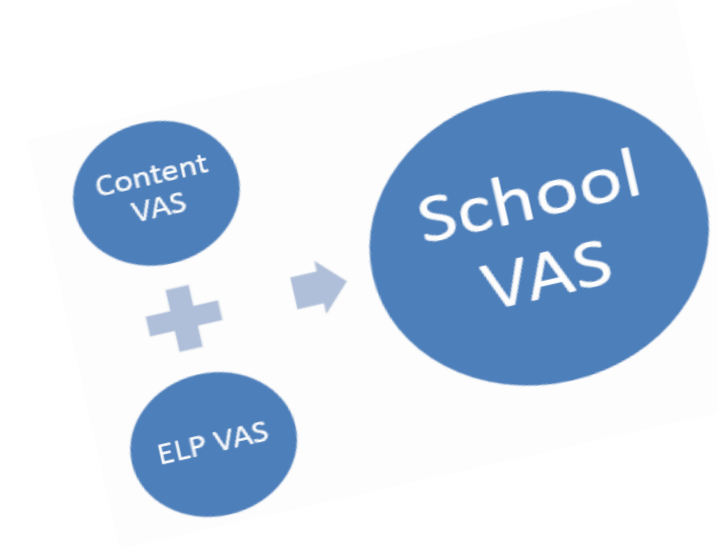
School Value-Added Score for the ESSA School Index

$$= \frac{\# \, EL \, w \, ELP \, Growth \, (ELP \, VAS) + \# \, Students \, w \, Content \, Growth \, (Content \, VAS)}{\# \, EL \, w \, ELP \, Growth + \# \, Students \, w \, Content \, Growth*}$$

Each student is counted once in the Content VAS.

- If math VAS only then student counts as 1 in # Students in Content VAS

Content VAS = math VAS value for student

- If ELA VAS only then student counts as 1 in # Students in Content VAS

Content VAS = ELA VAS value for student

- If ELA and math VAS then student counts as 1 in # Students in Content VAS

Content VAS = average of ELA and math growth scores for these students

$$Average = \frac{ELA\ VAS + Math\ VAS}{2}$$

Student still counts as 1 in # Students in Content VAS

Example: Elementary School with Low Proportion of ELs

13 English learners with ELP Growth Scores

- N ELs is 5.16% of Total Growth N
- $\left(\frac{13}{13+239}\right) \times 100 = 5.16\%$
- 82.69 ELP Growth Score

239 students with math and/or ELA Growth Scores*

- N Content is 94.84% of Total Growth N
- $\left(\frac{239}{13+239}\right) \times 100 = 94.84\%$
- 75.96 Math + ELA Content Growth Score

*This includes the 13 ELs' math and/or ELA scores for content.

ELs w ELP ≈ # ELs w Math and/or ELA content growth. Same students but due to different testing windows may or may not have all scores for both assessments (ELP and content).

School Value-Added Score for the ESSA School Index is 76.31 and calculated as follows:

- $\frac{13\,(82.69)+239\,(75.96)}{13+239} = \frac{1074.97+18154.40}{252} = \frac{19229.41}{252} = 76.31$

- Another way to calculate*
  - ELP growth is 5.16% of 82.69 = 4.27 points
  - Content growth is 94.84% of 75.96 = 72.04 points
    - 4.27 + 72.04 = 76.31 points for Content with ELP Growth

- 76.31 is 50% of ESSA School Index
  - 76.31 contributes ~38.16 points or 50% of 76.31 (rounded) to the ESSA Index Score
    - 1.97 points from ELP (38.16 X 0.0516) plus
    - 36.19 points from Content Growth (38.16 X 0.9484)

* (subject to rounding so may end up off by a fraction of a point)

Example: Elementary School with High Proportion of ELs

65 English learners with ELP Growth Scores

- N ELs is 43.33% of Total Growth N
- $\left(\frac{65}{65+85}\right) \times 100 = 43.33\%$
- 84.25 ELP Growth Score

85 students with math and/or ELA Growth Scores*

- N Content is 56.67% of Total Growth N
- $\left(\frac{85}{65+85}\right) \times 100 = 56.67\%$
- 82.09 Math + ELA Content Growth Score

*This includes the ~65 ELs' math and/or ELA scores for content.

ELs w ELP ≈ # ELs w Math and/or ELA content growth. Same students but due to different testing windows may or may not have all scores for both assessments (ELP and content).

School Value-Added Score for the ESSA School Index is 83.03 and calculated as follows:

- $\frac{65\,(84.25)+85\,(82.09)}{65+85} = \frac{5476.25+6977.65}{150} = \frac{12453.90}{150} = 83.03$

- Another way to calculate*
  - ELP growth is 43.33% of 84.25 = 36.51 points
  - Content growth is 56.67% of 82.09 = 46.52 points
    - 36.51 + 46.52 = 83.03 points for Content with ELP Growth

- 83.03 is 50% of ESSA School Index
  - 83.03 contributes ~41.52 ± 0.6 points* or 50% of 83.03 (rounded) to the ESSA Index Score
    - 17.99 points from ELP (41.42 X 0.4333) plus
    - 23.53 points from Content Growth (41.42 X 0.5667)

* (subject to rounding so may end up off by a fraction of a point)

Example: High School with Low Proportion of ELs

28 English learners with ELP Growth Scores

- N ELs is 7.04% of Total Growth N
- $\left(\frac{28}{28+370}\right) \times 100 = 7.04\%$
- 89.73 ELP Growth Score

370 students with math and/or ELA Growth Scores*

- N Content is 92.96% of Total Growth N
- $\left(\frac{370}{28+370}\right) \times 100 = 92.96\%$
- 80.61 Math + ELA Content Growth Score

*This includes the 28 ELs' math and/or ELA scores for content.

ELs w ELP ≈ # ELs w Math and/or ELA content growth. Same students but due to different testing windows may or may not have all scores for both assessments (ELP and content).

School Value-Added Score for the ESSA School Index is 81.25 and calculated as follows:

- $\frac{28\,(89.73)+370\,(80.61)}{28+370} = \frac{2512.44+29825.70}{398} = \frac{32338.14}{398} = 81.25$

- Another way to calculate*
  - ELP growth is 7.04% of 89.73 = 6.32 points
  - Content growth is 92.96% of 80.61 = 74.94 points
    - 6.32 + 74.94 = 81.25 points for Content with ELP Growth

- 81.25 is 35% of ESSA School Index
  - 81.25 contributes ~28.44 points or 35% of 81.25 (rounded) to the ESSA Index Score
    - 2.00 points from ELP (28.44 X 0.0704) plus
    - 26.44 points from Content Growth (28.44 X 0.9296)

* (subject to rounding so may end up off by a fraction of a point)

Example: High School with High Proportion of ELs

154 English learners with ELP Growth Scores

- N ELs is 46.39% of Total Growth N
- $\left(\frac{154}{154+178}\right) \times 100 = 46.39\%$
- 81.59 ELP Growth Score

178 students with math and/or ELA Growth Scores*

- N Content is 53.61% of Total Growth N
- $\left(\frac{178}{154+178}\right) \times 100 = 53.61\%$
- 78.94 Math + ELA Content Growth Score

*This includes the ~154 ELs' math and/or ELA scores for content.

ELs w ELP ≈ # ELs w Math and/or ELA content growth. Same students but due to different testing windows may or may not have all scores for both assessments (ELP and content).

School Value-Added Score for the ESSA School Index is 80.17 and calculated as follows:

- $\frac{154\,(81.59)+178\,(78.94)}{154+178} = \frac{12564.86+14051.32}{332} = \frac{26616.18}{332} = 80.17$

- Another way to calculate*
  - ELP growth is 46.39% of 81.59 = 37.85 points
  - Content growth is 53.61% of 78.94 = 42.32 points
    - 37.85 + 42.32 = 80.17 points for Content with ELP Growth

- 80.17 is 35% of ESSA School Index
  - 80.17 contributes ~28.06 ± 0.6 points* or 35% of 80.17 (rounded) to the ESSA Index Score
    - 13.27 points from ELP (28.06 X 0.4639) plus
    - 15.33 points from Content Growth (28.06 X 0.5361)

* (subject to rounding so may end up off by a fraction of a point)

Breakdown of School Value-Added Growth Score in Report

- Note the N's for each growth component.

School Content Value-Added Growth (VAS)					
	School Value-Added Growth Score	Content Growth Score	ELP Growth Score	ELA Value-Added Score	Math Value-Added Score
Score	86.8	88.16	78.99	82.45	93.65
Number of Students	155	132	23	132	132

Growth is weighted in the ESSA School Index

- Weights assigned by grade span
  - K – 5 & 6 – 8 have 50% weight for growth
  - 9 – 12 have 35% weight for growth

Fake Elementary
ESSA School Index

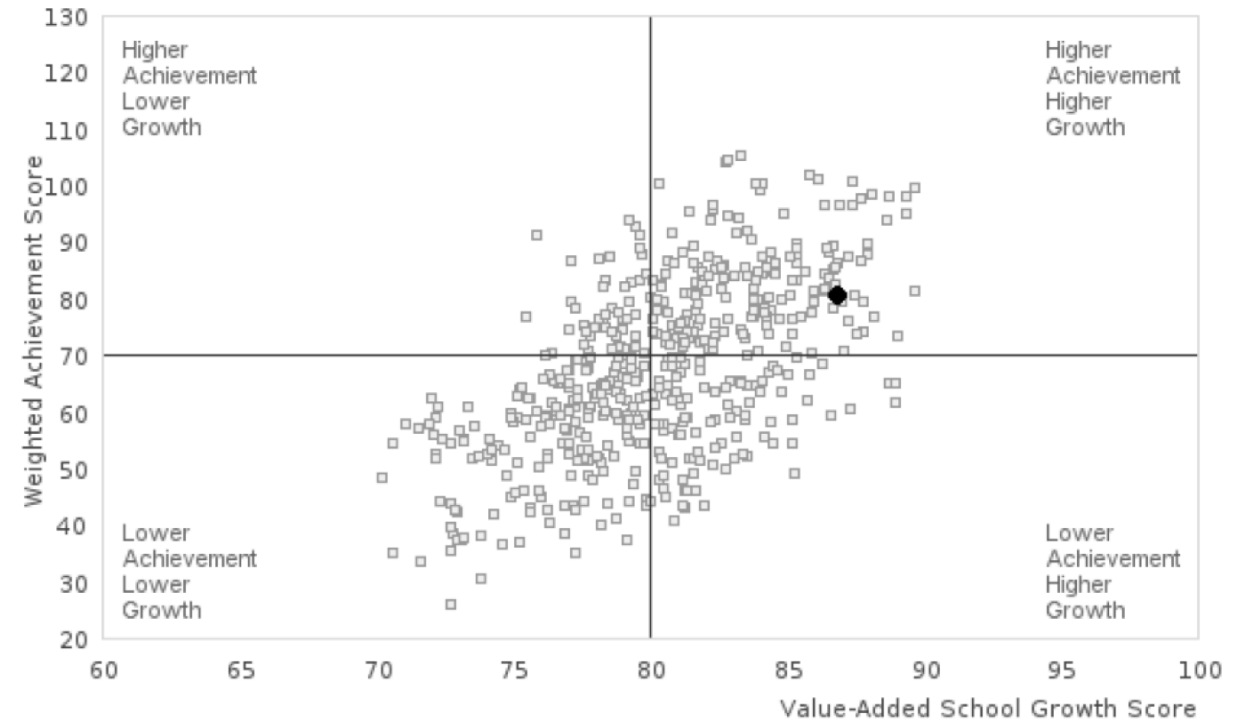| Indicator	Indicator Score	Weight	Points
Weighted Achievement	80.8	.35	28.28
Value-Added Growth	86.8	.50	43.40
School Quality and Student Success (SQSS)	74.05	.15	11.11
Overall ESSA Index Score			82.79

Growth Reports Available in ADE Data Center Using TRIAND Login

Value-Added Growth Score

86.8

The school growth score is based on a value-added growth model. This scatterplot shows how schools' average Value-added Growth Scores relate to schools' Weighted Achievement scores in their grade span. The value-added score of 80 represents students meeting expected growth, on average.

School Value-Added Growth Score Plotted with Weighted Achievement Scores

☐ All Schools in Grade Span
◆ Fake Elementary School

Resources

- http://www.arkansased.gov/divisions/public-school-accountability/every-student-succeeds-act-essa/informational-documents

- https://adedata.arkansas.gov/arc/